

NEW ENGLAND NOTE

INLAND SANDY ACID POND SHORES
IN THE LOWER CONNECTICUT RIVER VALLEY,
HAMPDEN COUNTY, MASSACHUSETTS

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The flora and plant communities of coastal plain ponds are well known in Massachusetts, having been the subject of intensive field studies related to rare plant and habitat conservation for this distinctive natural community type. However, relatively little is known about inland pondshore vegetation in the Commonwealth (Swain and Kearsley 2000), possibly due to the requirement for sampling to coincide with suitable conditions (i.e., a protracted period of drought and resulting water level drawdown; an interval of a few to several years may pass before these conditions are optimum). Extended severe drought and low groundwater levels during the summer of 2002 afforded a unique opportunity to qualitatively survey the flora and plant communities of drawn-down exposed sandy pondshores at 13 sites in the Lower Connecticut River Valley, Hampden County, Massachusetts.

Surveys of ponds known to have, or suspected to have, areas of exposed sandy shores were conducted in the towns of Springfield, Longmeadow, Ludlow, and Wilbraham (Table 1). It should be noted that Lake Lorraine and Five Mile Pond are essentially the same pond, separated into two parts by a railroad embankment. The perimeter of each pond was surveyed on foot in order to identify areas of exposed sandy shores and to qualitatively assess plant species composition and community zonation in the immediate vicinity of the shore. Access to the larger water bodies was facilitated by the use of a canoe.

PHYSICAL FEATURES

The ponds were located within a 10-mile radius of Springfield, the largest city in a densely populated physiographic province of west-central Massachusetts known as the Connecticut River Valley Lowlands (Motts and O'Brien 1981). The area is distinguished by a low, broad, north–south river valley transected by linear basalt ridges with high relative relief. All of the ponds visited occurred in areas of deep, acidic, well drained to

Table 1. Location of survey sites, inland sandy acid pondshores, Hampden County, Massachusetts. (Latitude/longitude coordinates expressed in degrees.-minutes.seconds.)

Site	Town	Latitude	Longitude	Area (acres)	No. Species
Five Mile Pond	Springfield	42.08.30	72.30.40	36	81
Lake Lorraine	Springfield	42.08.44	72.30.50	27	69
Mona Lake	Springfield	42.08.33	72.31.16	11	75
Loon Pond	Springfield	42.08.36	72.29.57	29	62
Bass Pond	Springfield	42.06.25	72.30.07	12	45
Dimmock Pond	Springfield	42.08.56	72.29.27	10	72
Long Pond	Springfield	42.09.16	72.30.30	18	71
Spectacle Pond	Wilbraham	42.08.59	72.26.19	16	68
Longmeadow Pond	Longmeadow	42.02.03	72.32.29	6	53
Minechoag Pond	Ludlow	42.09.46	72.27.36	21	87
Gamache Pond	Ludlow	42.10.14	72.29.18	15	81
Haviland Pond	Ludlow	42.10.21	72.28.29	25	58
Murphy Pond	Ludlow	42.10.17	72.29.37	8	67

excessively drained coarse-textured glaciofluvial sediments associated with flat to gently sloping glacial outwash plains and terraces (Hartshorn and Koteff 1967). Several of the ponds occurred in kettlehole depressions. Soils in the area are dominated by the Hinckley-Windsor-Merrimac association (Mott and Swenson 1978). Regional vegetation is predominantly the pitch pine-oak type described by Westveld et al. (1956).

Pond size varied in area from as small as 6 acres to as much as 36 acres (Five Mile Pond, Springfield), with most ponds surveyed being around 18 acres in size (McCann and Daly 1972). However, the area of exposed sandy shoreline present varied greatly from site to site, and overall pond size was not necessarily proportional to the amount of sandy pondshore habitat present. The extent of exposed sandy substrate appeared to be largely determined by basin morphometry (i.e., basins with shallow, very gently sloping littoral areas tend to have more sandy substrate exposed following relatively small reductions in water level). The frequency, magnitude, and duration of drawdown may also influence the amount of exposed sandy substrate by hastening the decomposition (oxidation) of organic matter admixed with mineral sediment (Zaremba and Lamont 1993).

FLORA AND VEGETATION

One hundred twelve species of vascular plants were observed at the ponds during the course of the 2002 field survey (Appendix). Although

shoreline vegetation was not quantitatively sampled at any of the 13 sites, five easily discernible generalized vegetation zones separated on the basis of gross physiognomy and relative elevation position were present at most of the ponds; these zones correspond to those described for coastal plain ponds on Long Island, New York (Zaremba and Lamont 1993). Brief descriptions of the zones are given below, and are listed in order from the upland border to the pond interior. Nomenclature follows Gleason and Cronquist (1991). Voucher specimens have been deposited at Eastern Illinois University (EIU), the New England Botanical Club Herbarium (NEBC), and the University of Michigan (MICH).

Zone 1 – Wetland shrub and tree thicket at the upland border. Common trees include *Nyssa sylvatica* and *Acer rubrum*; common shrubs include *Cephalanthus occidentalis*, *Vaccinium corymbosum*, and *Alnus serrulata*. Other less common shrubs include *Myrica gale*, *Clethra alnifolia*, *Rhamnus frangula*, and *Lyonia ligustrina*.

Zone 2 – Tall herbaceous and graminoid species at or slightly above the approximate elevation of mean high water. Common elements include *Lythrum salicaria*, *Decodon verticillatus*, *Polygonum pennsylvanicum*, *P. careyi*, *P. lapathifolium*, *P. sagittatum*, *Leersia oryzoides*, *Panicum dichotomiflorum*, *Echinochloa muricata* var. *muricata*, *Scirpus cyperinus*, *Epilobium ciliatum* var. *ciliatum*, *Verbena hastata*, *Bidens connata*, and *Eupatorium perfoliatum*. Plant height may reach as much as 4–6 feet in this zone, indicating probable persistence of individuals from year to year from surviving perennial rootstocks; stem densities are typically quite high. Most of the species listed for this zone are typical of eutrophic wetland environments, and probably reflect extraneous nitrogen inputs from developed residential areas on adjacent uplands.

Zone 3 – Low herbaceous species zone on predominantly sandy sediments exposed during seasonal or intermittent drawdown, typified by a great diversity of low, mostly annual, herbaceous and graminoid species. Included among the common species are *Cyperus dentatus*, *C. erythrorhizos*, *C. strigosus*, *C. bipartitus*, *C. squarrosus*, *Hemicarpha micrantha*, *Fimbristylis autumnalis*, *Rhynchospora capitellata*, *Juncus brevicaudatus*, *J. acuminatus*, *J. canadensis*, *J. pelocarpus*, *J. tenuis*, *Panicum rigidulum*, *Bidens cernua*, *Erechtites hieraciifolia*, *Gnaphalium uliginosum*, *Hypericum canadense*, *H. mutilum*, *Polygonum hydropiper*, *P. hydropiperoides*, *P. punctatum*, *Lycopus uniflorus*, *Lindernia dubia* var. *dubia*, *L. dubia* var. *anagallidea*, and *Agalinis purpurea* var.

purpurea. Density of vegetation in this zone varies from sparse cover to dense carpets of plants with little or no unvegetated sandy substrate. Species diversity per unit area is also typically quite high; as many as 15 species were noted within a one square yard area at Minechoag Pond, Ludlow. However, species composition in this zone is highly variable from site to site, and as noted by Zaremba and Lamont (1993), there may be great variability in composition from year to year. Due to the semi-permanently flooded hydrologic regime at these ponds, Zone 3 species may not be present every year due to high water levels.

Zone 4 – Low herbaceous and emergent species on semi-permanently flooded organic-rich pond bottom sediments. Common species include *Eleocharis ovata*, *E. flavescens*, *E. palustris*, *Scirpus smithii*, *S. pungens*, *Dulichium arundinaceum*, *Juncus pelocarpus*, *Sagittaria graminea* var. *graminea*, *Eriocaulon aquaticum*, *Ludwigia palustris*, *Gratiola aurea*, *Lindernia dubia* var. *dubia*, and *Utricularia gibba*. Emergent species with floating leaves found stranded on the exposed bottom include *Nuphar variegata*, *Nymphaea odorata*, *Brasenia schreberi*, *Potamogeton epihydrus*, and *P. bicupulatus*. Organic sediment accumulations in exposed pond bottom areas may be quite deep depending on basin morphometry. At Gamache Pond, Ludlow, a soil pit revealed 3.5 vertical feet of muck overlying basal mineral sediment in one portion of the pond interior. During the fall of 2002 after extended severe drought, dessicating organic sediments on the exposed bottom of Gamache Pond were deeply fissured to the basal mineral horizon in many areas.

Zone 5 – Emergent and aquatic species in permanently flooded portions of the pond. Common emergent or floating species in Zone 5 include *Nuphar variegata*, *Nymphaea odorata*, *Brasenia schreberi*, *Potamogeton epihydrus*, *P. bicupulatus*, and *Utricularia vulgaris*. Emergent species with floating leaves (particularly *N. odorata*) may locally cover much of the pond surface.

FLORISTICS AND RARE SPECIES

Sandy exposed pondshores at sites in the Lower Connecticut River Valley support a suite of distinctive plant species similar to those that occur on sandy pondshores on the coastal plain of southern New England and further south. These disjunct distributions may be the result of recent chance northward dispersal of propagules by migrant bird species, or may represent remnants of a relict southern flora that

extended northward into New England via the Connecticut River Valley during the postglacial hypsithermal period (see Zebryk 1991). The species are as follows: *Sagittaria teres*, *Rhynchospora scirpoides*, *R. macrostachya*, *Carex longii*, *Panicum verrucosum*, *Xyris difformis* var. *difformis*, *Fimbristylis autumnalis*, *Hemicarpha micrantha*, *Fuirena pumila*, *Juncus pelocarpus*, *Eriocaulon aquaticum*, *Scleria reticularis* (historic occurrence at Mona Lake, Springfield; Andrews 1924), *Rotala ramosior*, *Rhexia virginica*, *Hypericum mutilum*, *Gratiola aurea*, and *Viola lanceolata*. Several of these species (i.e., *Sagittaria teres*, *Rhynchospora scirpoides*, *Fuirena pumila*, *Scleria reticularis*, and *Rotala ramosior*) are quite rare in the Commonwealth, particularly so in western Massachusetts where they are disjunct (Sorrie and Somers 1999), and seem to be specific to the sandy pondshore community type. Although not considered uncommon in this habitat type in the coastal counties of Massachusetts, *P. verrucosum* is also disjunct at a few sandy pondshores in western Massachusetts. Andrews (1924) recorded the occurrence of the coastal plain species, *Orontium aquaticum* in a “pool” approximately one mile southwest of Mona Lake; however, this species was not observed at any of the sites in 2002.

Although bearing floristic similarities to coastal plain pondshores in Massachusetts, inland pondshores in western Massachusetts appear to have significant differences in terms of composition. This can be expressed primarily by the absence of a large number of species (mostly rare) that are described as being characteristic of, or specific to, pondshores in the coastal counties and on Long Island. For comparison see Swain and Kearsley (2000) and Zaremba and Lamont (1993).

During the course of the 2002 field surveys, a significantly large, previously unknown population of the state-endangered species *Rotala ramosior* was discovered in a cove at the northeast corner of Minechoag Pond, Ludlow. Occurring both on exposed sands and organic pond bottom sediments (i.e., Zones 3 and 4), many thousands of flowering and fruiting *Rotala* individuals were observed in association with typical Zone 3 and 4 species. This population was much larger both in terms of area and number of individuals compared to the population at Ashley Reservoir, Holyoke, which formerly was the only known occurrence of *Rotala* in similar habitat in western Massachusetts (Zebryk 1998). Also present at Minechoag Pond was a large population of *Ludwigia polycarpa* comprising tens of thousands of individuals distributed over most of the shoreline in Zones 2 and 3. Primarily a midwestern species, *L. polycarpa* is at its eastern range limit in western New England, and is considered threatened in Massachusetts. Other species of interest found at Minechoag

Pond include *Panicum philadelphicum*, *P. verrucosum*, *Xyris difformis* var. *difformis*, *Eriocaulon aquaticum*, *Polygonum careyi*, and *Proserpinaca palustris*.

A remarkably large population of *Rhynchospora scirpoides* consisting of thousands of individuals was observed in Zones 3 and 4 at Gamache Pond, Ludlow, where it occurred among a dense, lawn-like assemblage of graminoid and herbaceous species. Notable associates included *R. macrostachya*, *R. capitellata*, *R. alba*, *Fuirena pumila*, *Panicum philadelphicum*, *Xyris difformis* var. *difformis*, *Eriocaulon aquaticum*, and *Drosera intermedia*. During the early fall of 2002, Gamache Pond was the only site visited that had drawn down to the extent that no ponded water was present in the basin. It is suspected that the hydrological regime at this site has changed over the years, as there has been considerable woody plant encroachment (*Decodon verticillatus*, *Cephalanthus occidentalis*) into many portions of the basin interior.

Collections of *Carex longii* (Lake Lorraine, T.M. Zebryk 7839, MICH) and *Gnaphalium purpureum* var. *purpureum* (Five Mile Pond, T.M. Zebryk 7784, MICH) are apparent Hampden County records, and represent disjunct populations of species previously known only from coastal counties in Massachusetts (Sorrie and Somers 1999; Ray Angelo, NEBC, pers. comm.). *Gnaphalium* is exceedingly rare throughout New England (Brumback and Mehrhoff et al. 1996).

Callistephus chinensis, a showy annual member of the Asteraceae native to East Asia, was documented for the the first time in Massachusetts at Bass Pond, Springfield (T.M. Zebryk 7981, NEBC). Growing without cultivation and evidently originating from seed, a single depauperate plant was observed with other low native and introduced annual herbaceous species on a portion of sandy exposed pondshore. This taxon has been recorded only once before in New England, at Mount Desert Island, Maine (Ray Angelo, NEBC).

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APPENDIX

FLORISTIC COMPARISON, INLAND SANDY ACID PONDSHORES,
HAMPDEN COUNTY, MASSACHUSETTS

Site name abbreviations: Five Mile Pond (FIVE); Lake Lorraine (LORR); Mona Lake (MONA); Loon Pond (LOON); Bass Pond (BASS); Dimmock Pond (DIMM); Long Pond (LONG); Spectacle Pond (SPEC); Longmeadow Pond (LOME); Minechoag Pond (MINE); Gamache Pond (GAMA); Haviland Pond (HAVI); Murphy Pond (MURP). HIST = historic occurrence. Voucher specimens on deposit at NEBC, MICH, EIU; the author's collection numbers are in italics.

LILIOPSIDA (Monocots)

ALISMATACEAE. *Sagittaria engelmanniana* – FIVE, LORR, MONA, DIMM, SPEC, LOME, MINE, GAMA, MURP; 7801, 7939. *Sagittaria graminea* var.

graminea – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, MINE, GAMA, MURP; 7799, 7912. *Sagittaria teres* – FIVE, LORR, SPEC; 7800, 7841.

CYPERACEAE. *Carex longii*—LORR; 7839. *Cyperus bipartitus* – FIVE, LORR, MONA, LOON, DIMM, LONG, SPEC, MINE, GAMA, HAVI, MURP; 7768, 7843. *Cyperus dentatus* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7790, 7804, 7821, 7852. *Cyperus diandrus* – FIVE, MONA, DIMM, MINE, GAMA; 7786, 7950. *Cyperus erythrorhizos* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7769, 7908, 7937. *Cyperus squarrosus* – FIVE, LORR, MONA, LOON, DIMM, SPEC, MINE, GAME, HAVI; 7897. *Cyperus strigosus* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7819, 7865, 7941. *Dulichium arundinaceum* – FIVE, MONA, LOON, DIMM, LONG, SPEC, MINE, GAMA, MURP; 7850, 7956. *Eleocharis acicularis* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7781. *Eleocharis flavescens* – FIVE, LORR, MONA, LOON, DIMM, LONG, SPEC, MINE, GAMA, HAVI, MURP; 7785, 7816. *Eleocharis ovata* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7924, 7931, 7940. *Eleocharis palustris* – FIVE, LORR, MONA, LOON, DIMM, LONG, SPEC, MINE, GAMA, HAVI, MURP; 7914. *Fimbristylis autumnalis* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7772, 7818, 7906. *Fuirena pumila* – FIVE, MONA, SPEC, MINE, GAMA; 7823, 7863, 7902. *Hemicarpha micrantha* – FIVE, LORR, MONA, LOON, SPEC, MINE, GAMA, HAVI; 7788, 7842; 7895. *Rhynchospora alba* – GAMA; 7959. *Rhynchospora capitellata* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7771, 7846, 7898. *Rhynchospora macrostachya* – SPEC, GAMA; 7862; 7957. *Rhynchospora scirpoides* – MONA (HIST), GAMA; 7943. *Scirpus cyperinus* – MONA, LOON, DIMM, LONG, SPEC, MINE, GAMA, MURP. *Scirpus pungens* – FIVE, LORR, MONA, LOON, DIMM, SPEC, GAMA, HAVI, MURP. *Scirpus smithii* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7809, 7905, 7933, 7948. *Scirpus validus* – SPEC; 7859. *Scleria reticularis* – MONA (HIST).

ERIOCAULACEAE. *Eriocaulon aquaticum* – FIVE, LORR, MONA, LOON, LONG, SPEC, MINE, GAMA, HAVI; 7778, 7899.

JUNCACEAE. *Juncus acuminatus* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP. *Juncus brevicaudatus* – FIVE, LORR, MONA, DIMM, LONG, SPEC, LOME, MINE, GAMA; 7767, 7952. *Juncus canadensis* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7811, 7953. *Juncus marginatus* – FIVE, LORR, LOON, LONG, SPEC, MINE, GAMA. *Juncus pelocarpus* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7793, 7860, 7904. *Juncus tenuis* – FIVE, LORR, LOON, BASS, DIMM, LONG, SPEC, MINE, HAVI; 7766, 7783.

POACEAE. *Digitaria filiformis* – FIVE, MONA, LOME, MINE; 7829, 7916. *Echinochloa muricata* var. *muricata* – FIVE, LORR, MONA, LOON, BASS,

DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7854. *Eleusine indica* – FIVE, LORR, HAVI; 7795. *Leersia oryzoides* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7949. *Panicum dichotomiflorum* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7808, 7810, 7893. *Panicum lanuginosum* var. *fasciculatum* – LORR, MONA, LOME, MINE; 7807, 7838. *Panicum meridionale* – DIMM; 7851. *Panicum philadelphicum* – FIVE, LORR, MONA, DIMM, SPEC, LOME, MINE, GAMA; 7820, 7822, 7911, 7960. *Panicum rigidulum* – FIVE, LORR, MONA, LOON, DIMM, LONG, SPEC, LOME, MINE, GAMA. *Panicum verrucosum* – MONA, DIMM (HIST), MINE; 7871, 7903. *Poa palustris* – LONG, GAMA; 7773, 7802.

POTAMOGETONACEAE. *Potamogeton bicupulatus* – FIVE, LORR, MONA, LOON, DIMM, LONG, SPEC, MINE, HAVI, MURP; 7776. *Potamogeton epihydrus* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP.

SPARGANIACEAE. *Sparganium americanum* – SPEC, MONA, LONG, MINE, GAMA, MURP; 7858.

XYRIDACEAE. *Xyris difformis* var. *difformis* – FIVE, LOME, MINE, GAMA; 7896, 7934.

MAGNOLIOPSIDA (Dicots)

ACERACEAE. *Acer rubrum* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP.

ASTERACEAE. *Bidens cernua* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7917, 7951. *Bidens connata* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7954. *Callistephus chinensis* – BASS; 7981. *Erechtites hieraciifolia* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7923. *Eupatorium perfoliatum* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7855. *Gnaphalium obtusifolium* – BASS; 7982. *Gnaphalium purpureum* var. *purpureum* – FIVE; 7784. *Gnaphalium uliginosum* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7794, 7915.

BETULACEAE. *Alnus serrulata* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP.

BRASSICACEAE. *Cardamine pensylvanica* – LONG; 7760. *Rorippa palustris* var. *fernaldiana* – LONG; 7763.

CABOMBACEAE. *Brasenia schreberi* – FIVE, LORR, MONA, LOON, DIMM, LONG, SPEC, MINE, HAVI, MURP.

CLETHRACEAE. *Clethra alnifolia* – FIVE, LOON, DIMM, LONG, LOME, MINE, GAMA.

CLUSIACEAE. *Hypericum canadense* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7787, 7789, 7817, 7909. *Hypericum mutilum* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7946. *Triadenum fraseri* – LONG; 7759. *Triadenum virginicum* – FIVE, MONA, DIMM, LONG, MINE, GAMA, MURP; 7847.

DROSERACEAE. *Drosera intermedia* – GAMA; 7935.

ERICACEAE. *Lyonia ligustrina* – FIVE, LORR, LOON, DIMM, LONG, SPEC, LOME, MINE, GAMA. *Vaccinium corymbosum* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP.

EUPHORBIACEAE. *Euphorbia maculata* – FIVE, LORR, LOON, BASS, DIMM, LONG, HAVI; 7827.

HALORAGACEAE. *Myriophyllum humile* – FIVE, LORR, DIMM, MINE, GAMA, MURP; 7894. *Proserpinaca palustris* – MINE, GAMA; 7901, 7958.

LAMIACEAE. *Lycopus americanus* – MINE; 7928. *Lycopus uniflorus* – FIVE, LORR, MONA, LOON, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP. *Mentha arvensis* – LONG, MINE; 7918.

LENTIBULARIACEAE. *Utricularia gibba* – FIVE, LORR, MONA, LOON, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7765, 7932. *Utricularia purpurea* – MINE; 7926. *Utricularia resupinata* – MONA (HIST). *Utricularia vulgaris* – FIVE, LORR, MONA, LONG, SPEC, MINE, HAVI, MURP.

LYTHRACEAE. *Decodon verticillatus* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7955. *Lythrum salicaria* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7826. *Rotala ramosior* – MINE; 7922.

MELASTOMATACEAE. *Rhexia virginica* – FIVE, LOME, GAMA; 7849.

MYRICACEAE. *Myrica gale* – FIVE, LORR, LOON, DIMM, LONG, LOME, MINE, GAMA, HAVI, MURP.

NYMPHAEACEAE. *Nuphar variegata* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, MINE, GAMA, HAVI, MURP; 7947. *Nymphaea odorata* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, MINE, GAMA, HAVI, MURP.

NYSSACEAE. *Nyssa sylvatica* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7857.

ONAGRACEAE. *Epilobium ciliatum* var. *ciliatum* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7792. *Ludwigia alternifolia* – FIVE, LORR, MONA, LOON, DIMM, SPEC, MINE, GAMA, MURP; 7840. *Ludwigia palustris* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7927. *Ludwigia polycarpa* – MINE; 7929.

POLYGONACEAE. *Polygonum amphibium* var. *emersum* – FIVE, LONG, MINE, GAMA, HAVI, MURP; 7919. *Polygonum careyi* – FIVE, MONA, DIMM, MINE, GAMA, MURP; 7825, 7868. *Polygonum hydropiper* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7774, 7797, 7925. *Polygonum hydropiperoides* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7815, 7824. *Polygonum lapathifolium* – MONA, LONG, MINE, GAMA, MURP; 7775, 7805. *Polygonum pensylvanicum* – MONA, MINE, GAMA, MURP; 7866, 7942. *Polygonum punctatum* var. *punctatum* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7798, 7869. *Polygonum sagittatum* – FIVE, LORR, MONA, DIMM, LONG, SPEC, LOME, MINE, GAMA, MURP; 7867. *Rumex orbiculatus* – FIVE; 7803.

RANUNCULACEAE. *Ranunculus pensylvanicus* – SPEC, MURP; 7861, 7930.

RHAMNACEAE. *Rhamnus frangula* – MONA, LOON, DIMM, LONG, LOME, MINE, GAMA, HAVI, MURP.

ROSACEAE. *Potentilla norvegica* – FIVE, MINE, MURP; 7921.

RUBIACEAE. *Cephalanthus occidentalis* – FIVE, LORR, MONA, DIMM, LONG, SPEC, MINE, GAMA, MURP.

SALICACEAE. *Salix nigra* – MONA; 7864.

SCROPHULARIACEAE. *Agalinis purpurea* var. *purpurea* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7770, 7779, 7784, 7814. *Gratiola aurea* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7845. *Lindernia dubia* var. *anagallidea* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7782, 7813, 7938. *Lindernia dubia* var. *dubia* – FIVE, LORR, MONA, LOON, BASS, DIMM, LONG, SPEC, LOME, MINE, GAMA, HAVI, MURP; 7945.

VERBENACEAE. *Verbena hastata* – FIVE, LORR, MONA, BASS, DIMM, LONG, MINE, GAMA, HAVI, MURP; 7780.

VIOLACEAE. *Viola lanceolata* var. *lanceolata* – FIVE, DIMM, LOME, MINE, GAMA, MURP; 7791, 7853.